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London

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ON THE

SECURITY AND MANUFACTURE

OF

BANK NOTES.

A LECTURE AS DELIVERED AT THE ROYAL INSTITUTION OF GREAT BRITAIN, ALBEMARLE STREET, FRIDAY EVENING, MAY 9, 1856.

HIS GRACE THE DUKE OF NORTHUMBERLAND, PRESIDENT, IN THE CHAIR.

By HENRY BRADBURY, M.R.I.

LONDON:
PUBLISHED BY BRADBURY AND EVANS, WHITEFRIARS,
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BRADBURY AND EVANS,
PRINTERS EXTRAORDINARY TO THE QUEEN,
WHITEFRIARS.

TO THE

BANKING INTEREST AND COMMERCIAL WORLD

This Lecture

ON THE

MANUFACTURE OF BANK NOTES

IN CONNECTION WITH

THE QUESTION OF SECURITY AGAINST FORGERY,

IS INSCRIBED BY

HENRY BRADBURY.

LONDON,
WHITEFRIARS, 1856.

ON THE

SECURITY AND MANUFACTURE

OF

BANK NOTES.

THE many processes connected with the manufacture of Bank Notes, invest the subject with deeper interest than the mere importance attached to them as symbols of commercial confidence. To enter into the consideration of these processes would require more time than is at my disposal. My object, therefore, is rather to direct your attention to the consideration of that which is the most important feature in their manufacture, namely the engraving, because upon it their security in the eyes of the public mainly depends. It may perhaps be asked,—What occasion is there for discussing this question? My reply is: that forgery is on the increase;* that difference of opinion exists as to the soundest method to be employed for obviating it; that facilities are growing up to assist forgery; and that, further, there is a tendency to employ that method which, in reality, is most exposed to the operations of the forger. If, indeed, we could be sure that the advance of genuine Art must ever distance that of the spurious—if the success of the forger were to stand in an inverse ratio to the genius of the

* On referring to the file of "The Times" Newspaper, for the year 1854, (under the old form of the note), we find thirteen cases of forgeries of Bank of England notes; while for the year 1855, (under the new form), we find seventeen cases of forgeries: in the present year, up to March 28th, we find nine cases,—showing a steady increase of the crime.

There can be very little doubt, that, apart from incidental notices in the Police reports, exciting a passing interest, but in connexion with the more solemn aspect of this question, forgery is on the increase. Nor is this consideration, to our view, lightened at all by the fact, that we are not made publicly and officially aware of the exact extent to which this is carried, or the amount of Bank of England notes which the Bank annually marks as forged.

artist—and if we were to ignore the wonderful skill and ability of the so-called uneducated classes—then indeed this subject would lose a considerable portion of its interest, and its technicality would be deprived of its moral importance.*

Had, however, the report of the Committee,† (though sitting upon this question so far back as 1819), been acted upon, it appears to me that this state of things could never have arisen; for they arrived at those sound conclusions which are perfectly applicable at the present day. This Committee was organised in consequence of the rapid increase of convictions for the circulation of Bank of England Note forgeries.‡ Juries began at last to feel a reluctance to visit with capital punishment a crime, for the prevention of which no proper precautions seemed to have been taken.§ The fact, also, that forged notes had passed undetected the scrutiny of the Bank Inspectors—determined the Council of the Society of Arts to take this step. The point for their especial consideration was to determine the means within the compass of Art, not so much totally to prevent the forgery of Bank of England Notes, (for that was obviously impossible),

* In a discourse on the Bank of England Note, delivered at the Royal Institution, in 1850, the Rev. John Barlow attributed the increase of forgeries, in the two or three years previous, "to the disturbed state of Europe calling forth necessitous ingenuity to imitate the paper money of almost the only undisturbed monarchy;" to which might be added (writes Mr. Granville Sharp, in his Prize Essay) the results of the Railway mania, and succeeding panic. The general decline of forgery, he, the Rev. Mr. Barlow, referred "to the good effects of education and moral training, and to the example of a Christian legislature, by the abolition of capital punishment for this offence, setting a value upon human life."

† Report of the Committee of the Society of Arts, on the Mode of Preventing the Forgery of Bank Notes, &c. London. 1819.

‡ "From the issue of small notes in February, 1797, to the end of 1817—twenty years—there were no fewer than eight hundred and seventy prosecutions connected with Bank Note Forgery, in which there were only one hundred and sixty acquittals, and upwards of three hundred executions! 1818 was the culminating point of the crime. In the first three months there were no fewer than one hundred and twenty-eight prosecutions by the Bank; and by the end of that year, two-and-thirty individuals had been hanged for Note Forgery. So far from this appalling series of examples having any effect in checking the progress of the crime, it is proved that at, and after that very time, base notes were poured into the Bank at the rate of *a hundred a day!*

"The enormous number of undetected forgeries afloat, may be estimated by the fact, that from the 1st of January, 1812, to the 10th April, 1818, one hundred and thirty-one thousand three hundred and thirty-one pieces of paper were ornamented by the Bank officers with the word 'Forged'—upwards of one hundred and seven thousand of them were one pound counterfeits."—*Gilbart's Prize Essay, by Granville Sharp.*

§ "A committee was also appointed by the Government, to inquire into the best means of prevention, and one hundred and eighty projects were submitted. These mostly consisted of intricate designs, such as rendered great expense necessary to imitate; but to the great chagrin and disappointment of certain ingenious engravers, none of these were adopted."—*Gilbart's Prize Essay, by Granville Sharp.*

as to elicit means of detection by increasing difficulty of imitation. From their report it appeared, (and it must be borne in mind that they made it a question applicable to other Banks), that each of the methods then in use, not dissimilar to those of the present day, had their respective merits, if carried to the highest results; namely, historical engraving—engine-work—chaste and elaborate ornament—perfection of type combined with stereotype;* and that the applications of these, more or less, might be attended with success.

The highest authority of his day upon this question, the late Mr. Charles Heath, corroborated this when he stated that he considered the *primary* object in the manufacture of a Bank Note should be to make it *absolutely inimitable;* † were this unattainable, then to put difficulties in the way of the forger so great as to render it *not remunerative;* if this could not be carried out, to adopt a

* Several propositions for applying type and stereotype, were put forward in 1819, foremost and prominent of which were those of Sir William Congreve, T. C. Hansard, Esq., and John Holt Ibbetson, Esq., for constructing Bank Notes which should be unassailable by forgers. Mr. Hansard's plan was put forward on the plea that it required the combination of a greater number of artists than was required in copper-plate engraving. Sir William Congreve and Mr. Ibbetson argued for imprinting on Bank Notes, in different colours, designs in detached parts, so as to form, when brought into juxta-position, whole and perfect figures. Mr. Ibbetson put forward as his criterion of security the adoption of engraving executed by machinery, while Sir William advocated the adoption of engraving by hand. Neither, however, advanced claims high enough to warrant their adoption at that period,—how much less then at the present?

† There is no difficulty in making an *inimitable* note: this is not the point. The real difficulty consists in making a note in which the public can distinguish the original from the copy, and so cause the copy to be at once repudiated.

"*First or highest degree of protection.* If a Bank note can be made absolutely inimitable, so that no human art can copy it, or any portion of it, beyond all doubt it ought to be preferred; supposing always that it unites other necessary qualifications, such as sufficient cheapness, capability of being produced in numbers on Bank paper, &c. If such cannot be obtained, then the *second degree of protection* must be sought for, and one which would be, in fact, equally a protection to a currency; that is, some note which, although not absolutely inimitable, presents such difficulties, that it could not be reproduced at a price that would give a profit to the forger. If even this cannot be found, then *that note which, on the whole, is the best,* that is, such as can be forged by the fewest persons, requires the greatest labour, the highest degree of Art, and the most money, and the forgeries of which can be most easily pointed out and detected, ought to be sought and adopted.

"To reach the *second degree* of perfection, is all that is really necessary to accomplish protection from forgery. The object of inquiry ought however to be, *which is the best?* If that best attains the *second degree* of perfection, that is, if it cannot be counterfeited *with a profit to the forger,* it is evidently all that is really required."—*Extract from letter by Mr. Heath to Secretary of State for Home Department.*

"The time has long since passed away when scientific men would think of attempting to devise an inimitable note. A note to be inimitable must be made with a skill superior to the power of imitation of all men. The doctrine of inimitability should be buried with that of the philosopher's stone and the elixir of

method which should bear *exclusiveness* in *reproduction in fac-simile*. He conceived that it was sufficient, if the cost of the imitation in trouble and money deprived the transaction of its desired remuneration. This, he believed, could be acquired by the *quantity* and *quality* of the work put upon the face of the note. In these days, however, additional means become necessary.* Processes are known by which the engraving can *copy itself*, and in this case, *quantity* of work is of course, beside the question.

This report was one of great value, and is in these days, I conceive, still further capable of extension, with the aid of a nice judgment, joined to artistic advantages which can now be commanded, to obviate many of the difficulties† which originally beset this subject. By these means, and by these means alone, may a result be presented, new, and of so high a character, as to set it above the reach of any forging efforts. In other words, I conceive the object to be aimed at, should be to stamp upon the production an *individuality*,‡ expressing qualities which are not within the province of Mechanical imitation. The work which has the genius of an artist imprinted on it, is not to be imitated by an inferior mind,—no, not even repeated by the artist himself.

With respect, then, to this question of Engraving which I have advanced to be the purport of my paper; my second object is to show you how far those principles advocated by Mr. Heath are capable of being carried out, and that his

life; nevertheless, certain properties are demanded by the mercantile community, whereby a man may readily determine a good note."—*Smee on the New Bank of England Note, and the substitution of surface-printing from electrotypes for copper-plate printing, Dec. 22nd*, 1854.

* "It is hardly to be expected, that any one plan will be successful in checking forgery for any great length of time. Many things can now be easily executed that were very difficult some time ago; and probably many things which are now considered difficult, will cease to be so at a future time."—*R. H. Solly, Esq., Extract from Report, Society of Arts*, 1819.

† "We are all too apt to think that Art will stop at our point, and not progress, but it is the property of invention ever to move forward. The point at which we have arrived must be the step from which future improvements must spring, and proceeding step by step, the highest possible excellence will doubtless eventually be secured."—*Smee on the New Bank of England Note.*

‡ The term *individuality*, that I have made use of as applied to the Bank Note, has proved a stumbling-block in the minds of several I have conversed with on the subject. The more, however, that I have pondered as to its applicability, the more I am convinced of its correctness. By "individuality," I mean that whole specially belongs to anything, and which being inherent in it, at once and for ever distinguishes it. That which attracting you to it, impresses itself upon you, thus constituting a familiarity of recognition which can never be effaced.

principles are now susceptible of an efficient practice. The main feature, then, of the note, the Engraving, and its security, has been proved in practice as well as deposed to by artists of eminence, to depend upon the Vignette.* The higher the quality of the artistic impress, therefore, which the vignette carries—the purer and severer the tone conferred upon its execution—the greater the security of the note. My own belief upon the subject is, that this artistic impress may be still further extended to the whole face of the production.

The great value of the vignette consists in this, that it is the uncounterfeitable seal of the note.† I say uncounterfeitable, because, though it may be imitated, its individuality cannot. Let me explain this by a comparison with a picture; it always conveys the style of the artist: we know his composition—his colour—and his *chiaroscuro*—which the component parts of all works of Art have—a special individuality, not to be obliterated from our memory and which no copy can possess.

However similar, there is a difference in the human countenance;—however similar, there is a difference in handwriting. If then any number of the most eminent engravers were to endeavour to copy each other,—there would be sufficient evidence on casual examination to detect it. In a rivalship between them they might produce a work of similar beauty and general effect, but the

* "The vignette upon the Bank of England Note was originally introduced for the purpose of throwing a difficulty in the way of the forger; and, for some time, it probably answered its purpose tolerably well, but the number of persons possessing some degree of skill in the art of engraving has continued to increase."—*R. H. Solly, Esq., Extract from Report, Society of Arts*, 1819.

"The proprietors of the Plymouth Dock Bank, about eighteen years since, were forged upon: they, in consequence, had a handsome vignette designed, and engraved by an eminent historical engraver. He has engraved several successive plates for them, and they have never been imitated."—*Extract from a Paper delivered by J. T. Barber Beaumont, Esq., to the Bank of England*, 1817.

† "Now if, instead of being the common-place work of *inferior writing engravers* (*who are so numerous*), Bank Note plates were *master-pieces* of the *best historical engravers* (*who are so few*), whose talent is so rarely to be found, the number of persons who would be able to attempt an imitation, with any chance of success, would be very inconsiderable indeed—not ten persons, perhaps, where there are now ten thousand. But these persons, by the legitimate use of their talents, can acquire competence—they, therefore, are not likely to employ their time, and risk their lives in felonious imitations. Nay, if in the perversity of the human mind, a first-rate artist were disposed to turn forger, he could not do it successfully, because, even in the very first rank of historical engravers, one cannot imitate the engraving of another in a work of importance, such as an historical group finished in the best style, without the difference of manner being visible."—*Extract from a Paper delivered by J. T. Barber Beaumont, Esq., to the Bank of England*, 1817.

difference of manner would be obvious to the commonest observer, and not only would the forgery be discovered, but the hand that had executed it would be identified.* The eye of the Banking clerk, or the man of business, would soon become expert at this kind of fine-Art reading. This was proved in the case of the Plymouth Bank half a century ago; their bills were forged, their notes were not, simply on account of the vignette. When the vignette was added to the bills the forgeries ceased.†

Of the various methods of engraving, the choice more especially lies between that of *intaglio* and *surface-engraving*, between steel and copper-plate, or letter-press and wood-engraving; of the two, the first ranks pre-eminent, both for its beauty and adaptability to the production of Bank Notes. Possessing the greatest delicacy of details, greatest power of light and shade, it is the only process capable of giving the combination of purity and power which distinguishes the true fine-Art production. Years ago, objections might have been validly urged against this method, but now they are completely excluded. When the cost consequent upon the engraving of plates as they wore out counterbalanced the advantages gained, and moreover, the often changing the individuality expressed upon the production, negatived its highest quality, the plan presented obstacles not easily surmounted in extensive practice; but now Science enables us to overcome the impediment, and the Electrotype gives from one original an infinity of reproduction, with little

* "If, for instance, Sharp were employed to engrave a plate, and Heath or Warren (I hope those gentlemen will pardon the supposition) were disposed to imitate it, they might produce a work of similar beauty and general effect to that of Sharp's, but the difference of manner would be obvious to the commonest observer, and not only would the forgery be instantly detected, but the hand that had done it be immediately identified—for historical engravers recognise each other's handling with as much facility as correspondents recognise each other's handwriting; and with more certainty. It is, therefore, not within the verge of probability to suppose that first-rate artists, enjoying large incomes, would commit a crime, where defeat, detection, and punishment, could not fail to light on them immediately; and as none but first-rate artists could make the attempt, it follows that an end would be put to the commission of the crime."—*Extract from a Paper delivered by J. T. Barber Beaumont, Esq., to the Bank of England*, 1817.

† "The partners (Plymouth Bank), some years since, wishing to have a distinct appearance between their *notes* and *bills*, had a new plate engraved for the latter, with only an *ornamental cypher* instead of the vignette. This was *no sooner issued than it was imitated*, whereupon they immediately discontinued the use of the cypher plate, and adopted the vignette, and *since then* they have had *no forgeries on them*. The artist tells me that he and other historical engravers have engraved vignettes for several Country Bankers, and that he never heard of a Forgery having been ATTEMPTED of any of *their* plates."—*Extract from a Paper delivered by J. T. Barber Beaumont, Esq., to the Bank of England*, 1817.

more than nominal outlay. The importance of this branch of science, namely, the Electrotype, as bearing upon the particular question before us, cannot be exaggerated; while in addition to the cheapness of reproduction, it must be obvious that those qualities to which I have attached the highest importance can, by these means, and these means alone, be preserved, imparting a definite unity—a fixed *one-ness*—so to speak, to the paper issue of a Bank or Nation, be it ever so extensive.*

With regard to letter-press or surface-engraving, its power is too limited in its effects to realise a high standard of artistic finish; while even cheapness, combined with rapidity of production, is not sufficient to counterbalance the absence of that continuous and unalterable individuality which should be sought for as the distinguishing feature of the Bank Note. I am aware that, in stating this as my opinion, I have to contend with the weight of contrary evidence; inasmuch as the Notes of the Bank of England, as also those of the Bank of France, Bank of Belgium, and Bank of Russia, are printed from surface-engraved plates: I still adhere, however, for the reasons before assigned, to the conviction that even such evidence cannot countervail the immeasurable superiority of the steel engraving for the main object desired, namely, security. There is, however, one application—and that of considerable magnitude—to which this mode of printing has become of late more immediately applicable. I allude to its use in the case of receipt-stamps in this country, and in that of postage-stamps in France. The postage-stamp of our country enters no more into the nature of my present subject than that of the manufacture of paper †—I wish it did, for I should be tempted to show that the principle, I am

* "An objection to the introduction of a work of fine Art is, that there would be a difficulty in procuring a sufficient supply of able artists to execute the number of plates required for their circulation. The answer to this objection is, that the Electrotype renders all engraving after the original unnecessary."

† "There is, perhaps, no part of the process of the manufacture of the Bank of England Note of more importance, and more replete with curious interest, than the production of the paper, by Mr. Wyndham Portal. The mill is situated in Hampshire, on the river Test. * * * * * *

"The new Bank Note has a new water-mark, and the design which has been adopted is attributed to Mrs. Wyndham Portal, who suggested the form of water-mark which has been approved. These alterations in the water-mark constitute an important part of the new note, and the tinting is effected by means of Smith and Brewer's patent—an invention which is considered as a valuable addition to the mechanical appliances of paper-making, and was rewarded by a medal at the Great Exhibition of 1851. They have carried out their contrivances in the Bank. The essential part of this process is the use of steel-faced dies,

now endeavouring to urge upon your attention, as applicable to Bank Notes, might be beautifully and beneficially (having due regard to economy) used in the manufacture of the postage-stamp also. In fact, my proposition is, that the union of Art in which our country has been deficient, with Manufacture in which she is unrivalled (the vision of which is dawning in the distance), would place England in advance of every other nation.

In the engraving of the Bank Note two principles are involved for our consideration: the first, the *simplicity* of its design, the purity of which is the gauge of its perfection; the second, the combination of vignette-work with intricate engine-work: both these principles possess high claims to the attention of Banking authorities as security against forgery—the one on account of the difficulty of mechanical imitation—the other on the principle of the certainty of a first-sight recognition. Of the two principles I regard simplicity of design, when it amounts,

which are engraved with the desired pattern, after which they are hardened, by being heated in leather charcoal, and then suddenly plunged in water. These dies are used with copper or tin forces in a stamping machine, to give an impression upon plates of sheet brass, and these plates when embossed are filed on the back to the requisite proportions, to allow the moisture of the pulp of the paper to pass through the apertures. The different pieces of brass, when struck, filed, and put together at the paper-mill, by Mr. Brewer, form the mould for the paper, and are so arranged that each mould is designed for two pair of notes.

"In practice, great advantages attend the use of this patent. In the first place, identity in the water-mark of the paper is secured, a matter of no small importance when the subject of Bank Notes is considered; and moreover it is specially adapted to give gradations of tints, lights, and shades, which, for the first time, have been introduced into the paper of the Bank of England Notes. * * * *

"The mould is dipped by hand into the vat of pulp, and a sufficient quantity taken up to make the note. This, as soon as the water is drawn off, is passed to a man, who puts it on a blanket, which slowly moves at a regular pace, and brings a new part into play for each mould of four notes as they are made. After the notes are placed in the blanket, they are carried under successive rollers till the water is squeezed out, and the pulp acquires consistency. This part of the process has performed the duties of the flannel and powerful press of the old system. The paper then, instead of being removed by a boy, as in the old process, is carried by machinery to the next part of the machine, where it is dried by passing over warm cylinders. When dry it is spontaneously carried to the sizing apparatus, where it is sized with the whitest and purest size, when it is finally dried in the last compartment of the machine by passing over heated cylinders. By all these processes, which have been in use in these machines, which make paper by the mile, paper made by the hand-mould is dried, sized, and dried again in the short space of half-an-hour, instead of requiring an interval of many days, as in the old process.

"Mr Portal, however, does not so much look to the rapidity as he seeks identity, for in all cases the pulp, being subjected to precisely similar conditions, may be expected to afford precisely similar results."—*Smee's Paper on the New Bank of England Note.*

Henry Bradbury's Specimen of a Simple Bank Note

Bradbury & Evans, Bank Note Engravers & Printers, Whitefriars London.

Henry Bradbury's Specimen of a Simple Bank Note

Bradbury & Evans, Bank Note Engravers & Printers, Whitefriars London.

if I may so speak, to the character of high-class Art,* as much the best with regard to the issue of National notes. Anything which addresses the mind is more clearly distinguishable than that which addresses the eye—and where variety of pattern and freaks of ornament distract the attention, it is put more within the field of the imitator than when he has to contend with an ideality—for which neither his education nor his pursuits are likely to fit him.

By way of illustrating this principle I here venture to submit to your inspection, what, in my opinion, should, or something similar, be the representative Note of a National Bank; for that which constitutes the representative of the currency of a nation, ought to be worthy of the State and the subject it represents; and in doing so, I have ventured to assume it to be a Note of the Bank of England, because that establishment stands proudly and pre-eminently at the head of the monetary transactions of the whole world, and because its notes are more familiar.†

The note before you is perhaps as simple as a National Note could safely be. Its attributes are individual unity, if not beauty; simple and salient features, with due prominency of numerical value. The general character has a sort of medieval cast—it has been chosen, partly because it is totally different from the cursive style in common use, and is also in accordance with the revival of that style in the present day.

The national characteristics are boldly expressed and displayed: attempt has been made to extend the artistic ideality of the Vignette—which is emblematic of the Nation—to the whole production. Breadth of design and unity of purpose have been sought for. Care has been taken in the introduction of the ornamentation,

* "The extraordinary beauty of the engraving must undoubtedly greatly increase the difficulties of the forger; for where fifty persons can make a tolerable copy of an ordinary engraving, there will not be found one who can make an equally good copy of a fine specimen; and I confidently submit that the common eye is more able to detect a bad copy of a *superior*, than a bad copy of an *indifferent* work; because the difference between the original and the counterfeit is in fact greater in the former case."—*Extract from Letter by Mr. Heath to Governor and Directors of Bank of England.* 1821.

† Here, by photo-microscopic means, was exhibited, on a screen, a specimen of a Simple note.

that it should not assume a position so prominent as to weaken the artistic effect, but rather serve as an auxiliary to Art. An additional and novel feature is thus conferred upon the writing, and all the points (and this should be borne in mind) observing their particular purposes, contribute to the general harmony of the whole. I am aware that this course has not hitherto been pursued, but I conceive that the security arising from the combination of thought and beauty has been hitherto altogether ignored. I place this note before you, however, merely as a suggestion, and in doing so, am fully aware how seldom it is for different persons to agree upon questions of Art. Objections may be raised against this specimen—the most prominent may be, that it is too architecturally bold—too florid in display—but it appears to me, that the nobler the character of a note, the less it would enter into the comprehension of the forger—and even if some were not sensible of the difference between a fine original and a bad copy, that is no reason why others of better judgment should be precluded. In this stage of the subject I rest the security upon its general excellence. For—not putting this note forward as the *ne plus ultra*—though advocating Art the highest mechanism the most perfect—there is an aspect superior to all these—the union of the created idea with the intelligent eye, producing the conviction of truth.

It would be contrary to my purpose, if, when I have presumed to dignify my own specimen by the name of the Bank of England, on account of the commanding authority which that name confers—I did not submit to you an original. This note ought, of all others, to be the most perfect. I feel myself obliged from the position it holds, to give you a brief account of its history.*

The Bank of England Note has always been characterised by simplicity, but carried to an extreme in the opposite direction, the same general design having been preserved from the issue of their first note. The objection I have to submit, however, is, that its simplicity is *too* simple,—not bearing upon the face of it

* Here was exhibited, by photo-microscopic means, the genuine Bank of England Note.

those features which characterise the true Art-point. The vignette * is a specimen the reverse of what I have been advocating; it is alike deficient in conception and execution. Surface-printing † having been chosen as the medium, the Bank authorities were restricted in the application of their Art.‡ In consequence of this the Bank of England Note in its present form is unworthy of the Bank and Nation.§ The great aim of the Bank has been to secure simple identity ‖ and ready

* "In this matter constancy of appearance is of paramount importance, and in this particular the new surface-note stands *pre-eminent*. The vignette is printed in every impression line for line invariably the same. The same expression of face is constantly maintained; the same number of lines in one impression is visible in the second, and however many number of thousands of notes may be issued, not the slightest possible variation within certain limits can exist. Moreover, the note is printed with a similar ink, and the same tone of colour preserved, that the public may be familiarised with a constant standard, and an uniform appearance will be marked in their mind."—*Smee's Paper on the New Bank of England Note.*

† "*For the general class of work*, I should say that surface-printing is as good as copper-plate printing, but for work such as the Bank of England Notes, the COPPER-PLATE affords some advantages over the surface-printing; flowing style of writing by surface-printing cannot approach copper-plate."—*H. Hensman, Esq., Evidence before Committee on Postage Stamp Labels.*

"COPPER OR STEEL-PLATE PRINTING is decidedly *more secure* from COUNTERFEIT than surface-printing. Copper-plate engraving is a higher order of Art than letter-press printing."—*E. Hill, Esq., Evidence before Committee on Postage Stamp Labels.*

"Very much greater facilities would be existing for imitation if the letter-press printing were adopted, than there are attaching to the system of copper-plate printing."—*E. Hill, Esq., Ibid.*

‡ "As a matter of art, the machinery employed is beautiful, but as far as *engraving* is concerned, the Bank had very little security before, and it has now adopted a plan by which it will probably have less."—*Granville Sharp—Gilbart Prize Essay.*

§ "The Bank of England Note, previous to Mr. Smee undertaking to improve it, had for many years remained a striking illustration of anti-economical principles. It had, however, the advantage of being printed by a system which left it open to improvement; and I think it quite within bounds to assume that had a sum of 50*l.* been judiciously expended at that time, in providing a suitable vignette or device, and combining it with the note, fifty times 50*l.* might have been saved annually in the item of paper, and at the same time additional security against forgery given to the note. However, Mr. Smee has taken an opposite course, and, by adopting a completely different system for printing the note, he has effected two very important things; whether important for good or evil, time will tell. Firstly, he has rendered it more than ever necessary to retain the use of a highly expensive paper for the Bank of England Note, and thus put a seal upon the possibility to its economic improvement, only to be broken by a fresh revolution in the machinery of the Bank and the system of printing the note."—*Grubb, Engineer of the Bank of Ireland.*

‖ "In speaking of identity, there is also another property of the eye to be considered, for although there can be hardly any such thing as absolute identity or likeness between any two objects, yet any objects which do not differ more than four seconds will appear alike to unaided vision, though with the microscope great differences may be discernible. Whenever, then, throughout this Paper I speak of identity, I refer to the identity observable by the unaided sight, and after all it is but a rough comparative identity, a mere vision of identity when examined in a philosophical point of view. As far as the public is concerned, nothing can exceed the value of an uniform appearance; this the new note affords in the highest degree. Day after

recognition through the excellence of the paper, known by its peculiar colour, by its thinness and transparency, as well as by its feel, crisp and tough, patent to the sense of touch alone. The basis of its security to the public rests upon its paper.* It is supposed to be unmatchable.† Such is the case in this country. Not because it cannot be imitated, but because the law affords ample supervision to detect it—which is as good as preventing it. As successful imitations‡ of this paper have been made abroad, and passed in this country, too much reliance ought not to be

day, and year after year, the character of the paper will not vary. The same signature of 'M. Marshall' which appears in the paper of one note, will be repeated in the next. The same wave lines, the same rough edges on the three sides, the same shadows in the water-mark, will be brought continually before the sight. The Britannia will have the same expression of countenance, and will be repeated line for line, and dot for dot, for millions of impressions unchanged and apparently unchangeable. The very weight of the paper does not vary above two or three grains, unless damaged by wear; and the colour of the ink will be maintained as far as possible. As the stone is worn by water constantly dropping, so will the mind be impressed with one uniform appearance. With these constant appearances, the public should become familiar; and really in a country like this, where the circulation of notes is so large, and the Bank has taken such pains to secure identity, he that does not make himself acquainted with the appearance of a genuine Bank Note does not deserve to be its possessor."—*Smee's Paper on the New Bank of England Note.*

"Now, with respect to 'identity,' of the high importance of which I am fully aware, I am prepared to show by and by that Mr. Smee has based his recommendation for change upon a false assumption: and I assert, and am prepared to prove, that in accomplishing a change from copper-plate to surface-printing, for the production of the Bank of England Note, he has only introduced one system possessing identity, to the rejection of another possessing the same quality, and in as high a degree."—*Grubb, Engineer of the Bank of Ireland.*

* "There are certain characteristics which are common to the whole class of Bank of England Notes, which should be known to all the world. In the first place, every note has three of the *natural* edges of the paper and one *cut* edge. In the centre of every note is a water-mark composed of waved lines, and the words 'Bank of England' are inserted in the substance of the paper at the upper and lower portion, with a fac-simile of the autograph of Matthew Marshall, the chief cashier of the corporation. The Britannia is printed on notes of all denominations, and all notes have the words 'I promise to pay the bearer on demand.'"—*Smee's Paper on the New Bank of England Note.*

† "*Partly*, to the quantity of utensils, and the outlay required for the production of a single sheet of paper, but *chiefly* to the Excise surveillance of this kingdom, are we indebted for the preventive effect of any water-mark in respect of forgery. But as our continental intercourse increases, this source of prevention decreases, and factitious water-marks, as they may be termed (which are produced by pressure and varnish, and easily distinguished as such,) are being replaced by genuine forgeries (to speak paradoxically), or water-marks produced in manner similar to the genuine, that is to say, in the manufacture of the paper."—*Grubb, Engineer of the Bank of Ireland.*

‡ "I or corroboration of the foregoing I may refer to the recent accounts in the newspapers of forgeries of the £5, £10, and £20 Notes of the Bank of England, which are stated to have come from the Continent, and of which upwards of £200, in apparent value, had already appeared at the Bank. The water-marks in these were, as in the genuine, different for each value of note, and are stated to be perfectly well executed, and produced in the making of the paper. This instance of rather wholesale water-mark forgery is a

placed upon this superiority of the paper.* Again, the fallacy of its security consists in the extreme facility it affords for reproduction by hand, apart from reproduction afforded either by the Anastatic or Photographic processes.† I have thought it only right to refer to these processes with reference to this note in particular, inasmuch as if the paper were procurable, a successful copy of the engraved parts might certainly be effected by the aid of Photography. From 1837‡ to 1854, these notes

striking illustration of the error of depending too much upon the paper of the note for protection."—*Grubb, Engineer of the Bank of Ireland.*

* "The Court of Assizes, on Tuesday, commenced the trial of twelve Spaniards for issuing forged Bank of England Notes. Only six of them, however, appeared, of the names of Galligo, Peco, Calzada, Pecazo, Fornes, and Ripoll; the other six, who have fled, are named Cortazar, Mas y Pinte, *alias* Massip, Mestres, Ramires, Castillo y Menes, and Navarro.

"The indictment set forth these facts, the principal of which are already known to the public. On the 9th of January, 1855, Peco, who is a Carlist refugee, with the grade of Colonel, went to the office of M. Monteaux, the money-changer in the Palais Royal, and presented eight bank notes of 5*l.* and two of 20*l.*; but they were immediately discovered to be forged. At first he declared that he had received them at the Bank of England; but he afterwards attempted to get away from the office. He was, however, arrested, and on being searched, seven other bank notes of 5*l.* and eight of 10*l.*, all forged, were found on him, as were also two good Bank of France Notes of 1000*f.* each, and a sum of 117*f.* in money. Two passports, one in his own name, and the other in that of Mas y Pinte, were also found on him. On the same day Peco had succeeded in getting four bank notes of 5*l.* and two of 10*l.* changed at the shop of M. Levy, money-changer, also of the Palais Royal. The investigation which was instituted led to the discovery that a large band of forgers and issuers of bank notes existed. It was ascertained that a Spaniard, named La Calzada, employed as interpreter at a Spanish hotel in the Rue Vivienne, had attempted to pass off a forged bank note for 10*l.* at the shop of M. Steffen, in the Passage des Panoramas, and that on being arrested he confessed that it had been given to him by one Mestres, who stated that he had received it with a bundle of others from Mas y Pinte. It was then discovered that these three men were in communication with two others named Castillo and Pecazo, at Bordeaux, and with three others, Galligo, Fornes, and Ripoll, in Germany; also, that the whole band were in correspondence with Cortazar and Mas y Pinte, *alias* Massip, who were in London, and who, in October, 1855, were condemned in that city for having obtained 1800*l.* on forged letters of credit. It further appeared that one or other of the band had at different times passed off forged Bank of England Notes at Perpignan, Geneva, Frankfort, Homburg, Cassel, Gotha, Dresden, Leipsic, Berlin, and other places; also that, after making an attempt to pass some notes at Lyons, which failed, Fornes had suddenly decamped, leaving in his hotel no fewer than thirty-nine forged notes of 10*l.* each. The court, after the indictment was read, proceeded to receive evidence against the prisoners in what concerned the issue of forged notes in France, and the evidence was not completed when the court rose. All the prisoners are of respectable appearance, and seem to possess considerable intelligence."—*Extract from Morning Paper*, 1856.

† "Lastly, by the introduction of type or surface-printing, he has involved the necessity of using an ink which, so far as I can learn, is necessarily of a quality well adapted to be transferred and used, according to the lithographic (or Anastatic) process, for printing fac-similes of the genuine notes in lithograph: and when it is recollected that the impressions from type or surface-printing are of a character very closely resembling lithographic impressions, it would appear that Mr. Smee's vaunted alterations are not yet to be classed as improvements."—*Grubb, Engineer of the Bank of Ireland.*

‡ In 1837, the Siderographic process was first adopted. The plates were touched and deepened by the

were printed from steel plates, reproduced by the Siderographic or Transfer process * at the commencement of 1855, a change† took place in the production of the notes by the substitution of surface-printing from electrotypes for steel-plate printing. A variation was then made in the form of the old note, by adopting an engraved signature instead of a manual one—the object being still further to strengthen the identity of recognition.‡

The note of the Bank of France is a fair specimen of surface-printing.§ Composed of a combination of disjointed Italian details—small and mean—twisted to form an oval—intersected by paltry medallions; deficient in breadth, plain and poor,

graver up to 1852;—between 1852 and 1854 they succeeded in making a successful Siderographic transfer without retouching. In 1855, surface-printing from electrotype plates was adopted; and I have been credibly informed that were it not for this change the plan for which I have contended throughout would have been pursued, namely, copper-plate printing from electro-plates as opposed to surface-printing.

* "If it is necessary to touch the plate, you destroy its identity at once."—*John Coe, Esq., Evidence before Committee of Postage Label Stamps.*

† "The advantages which Mr. Smee assumes as the result of such substitution are—Firstly. Increased facility and rapidity of production. Secondly. Increased economy in production. Thirdly. Printing effected on dry instead of damp paper. Fourthly. Identity of subject or matter printed."

"An instance of such errors consists in assuming, that by the adoption of surface-printing from Electrotype copies of finely cut type or blocks, protection is obtained, from the *difficulty* of cutting such superior type, *forgetting* that it is by no means necessary that a forgery should be produced by the same processes as the genuine note. In the instance before us, the forger has the option of using the much easier method of imitating the surface-printed note, by an engraved plate and copper-plate printing."

"The error here is rendered of more importance by the circumstance, that in the adoption of a process of medium delicacy for the production of the genuine note, the forger is placed on vantage-ground by the power *thereby gratuitously presented to him of copying it by means of a process of higher delicacy.*"

"There can scarcely be supposed a more striking instance of the error, than in the employment of *surface-printing*, as, not only is the general effect produced by it well represented by lithography, but *the ink* employed in such printing is, so far as I can learn, *necessarily* of a nature well suited to be transferred (from a note so printed) *directly to the stone*, and *thereby enable an ordinary lithographer to print fac-similes of itself.*" —*Grubb, Engineer of the Bank of Ireland.*

‡ "Mr. Smee urges a claim to additional identity in the water-mark paper. Now so far as the shaded parts are concerned, identity, if obtainable, cannot be appreciated, and is therefore useless; and, for the other parts, the undefined character of any water-mark, as seen in the paper, is such that, taken in connexion with the unavoidable unequal contraction of the paper in the manufacture, it renders nugatory any greater amount of accuracy in a paper-mould than can be readily attained by the imitator."—*Ibid.*

§ "If we examine forms of notes printed by typography, we shall observe that the note of the Bank of France and the Belgian note are so produced, but in these cases the character of the note is adapted to the style of printing, and even there the number printed is so small as to appear insignificant when compared with the number issued by the Bank of England. At the former establishment about 300 impressions are printed every day; at the latter, nearly 30,000 are produced, as 9,000,000 notes are issued per annum, representing near 300,000,000*l.* of money."—*Mr. Smee's Paper on the New Bank of England Note.*

with an absence of all national characteristics: this indicates that its design has been adapted to the limited capabilities of surface-printing, and in this case is liable to those objections which are assignable to our own.* This is to be rather regarded as strange, bearing in mind the high character for taste possessed by our neighbours and allies. The note is printed on both sides at the same time, effected by pulling an impression on the tympan itself before pulling each impression of the note—the reason for so doing is that when the impression is pulled upon the face of the note, the paper receives two impressions at the same time,—the one, on the face of the note from the printing plate,—the other, on the reverse of the note, transferred from each impression on the tympan pulled previous to the genuine impression. The two impressions must necessarily register. This course has been pursued with this idea, that this perfect register of the two printings is a good gauge for detecting imitations. There is some reason in this, as it is a most difficult and tedious operation, requiring consummate skill on the part of the workman. It is said that not more than six hundred impressions are printed daily—which, however, does not speak much for economical production.†

Simplicity of design, however, is not to be advocated as solely applicable to a note in all instances. It is more especially suited for national notes, because immediate recognition‡ should be one of their essential features; but for provincial or local notes, not having so wide a commercial§ circulating range, the complex note

* Little safer than our own note: and the whole is capable of being reproduced by more than one self-copying process.

† A specimen Bank Note of the French nation was here submitted, though not by the photo-microscopic means, to show how the principle of fine-Art simplicity could be applied to other national institutions than that of the Bank of England. Its features were few;—the Imperial arms, surmounted by eagle and thunderbolt, surrounded with the Grand Cordon of the Legion of Honour, the Charlemagne sceptre, &c. This note being specially devised for cutting into two parts, for postal convenience; the penal code of France is repeated in duplicate.

‡ "Bankers have sought security to the public and themselves from forgery of their notes, by two distinct and widely different means. The Bank of England has adopted one course, essentially its own; whilst the other has been followed by bankers generally throughout the kingdom. The effort, in the perfecting of Bank of England paper, has been, to secure *simple identity* and *ready recognition*; in almost all other notes, to approach, as nearly as possible, to that which is *inimitable*."—*Granville Sharp.*

§ "Both classes of notes are especially adapted to their several purposes. Although an entirely opposite opinion is expressed indirectly by the advocates of the inimitable note, it nevertheless appears manifest,

has peculiar advantages, the display of national emblems—ideal impress—and intuitive recognition being here unnecessary; one merit in particular which it possesses, is that it is more available to represent small amounts, and for circulation among the humbler classes; for an obvious reason,—the repetition of the amount represented, affording to the holder a more continued appreciation of its value. In this case the more complicated the mechanical appliances introduced into the construction, the more precarious the chances of success against it and the greater the risk run in its reproduction.

Art being my principle of a simple note; Mechanics, or engraving by machinery, is that of a complex. This is performed in two ways; relief and medallion-work, guilloche or rose-engine-work. The one represents models on flat surfaces: the other lines, straight, waved or curved, circles, ellipses, parallel or intersecting, resulting in a particular effect.* Different results are sought in the combinations produced from such machines: some prefer figures to appear white on black. Others prefer the reverse, the natural one, black on white. The latter is free from the confusion presented in the former, and though the composition is more geometrical, open also to its particular objection, its effect is more beautiful, and affords a much greater degree of detection. As a proof of this the reader is referred to the workmanship executed by the guilloche or rose-engine machine, in the Complex note.

In the instruments required for the execution of such designs the adjustment admits of such variety, that even allowing the forger to be possessed of a similar

that the simpler the note the more readily it is recognised; and *ready recognition* is closely connected with *inimitability*. In order to afford ready recognition of Bank of England paper, the great object aimed at for years has been to secure *identity in every respect*. This is highly important, considering that Bank of England notes are carried occasionally to the most distant parts of the world, where persons would find it difficult to become extremely *au fait* in the judgment of an elaborate engraving; whilst the extreme simplicity and unaltered character of these notes, at once secures them confidence."—*Granville Sharp.*

* At this stage of the Lecture the attention of the Members was drawn to two unique machines, invented and constructed by F. J. Wagner, Junior, K.-H. Mechanicus, of Berlin. Of these two machines, one executes the relief, or medallion-work—possessing over other machines in this country the additional features of reducing, increasing, or reversing the position of the original subject; the other, guilloche, or rose-engine-work, possessing new features in its construction and powers from the introduction of novel movements, producing a new order of effects. It is no exaggeration to state, in honour to the inventor, who has laboured 30 years in their development, that these machines stand not only preeminent, but alone in this country.

Bradbury, Specimen of a Complete Bank Note

Bradbury & Evans, Bank Note Engravers & Printers, Whitefriars, London.

Henry Bradbury's Specimen of a Complete Bank Note

Bradbury & Evans, Bank Note Engravers & Printers, Whitefriars, London

instrument, the chances against hitting on the several requisites to produce any particular pattern are infinite. It may admit of a doubt, whether their very intricacy, and the want of any prominent part to impress the attention, would not allow even a general resemblance to pass in the hurry of business. But it is possible, however, to combine even within this intricacy of pattern and ornament an idea of that simplicity and singleness of recognition of which I was before speaking, and this I purpose to submit to you in this specimen.*

This note, for consecutiveness of argument, I have also presumed to dignify with the name of the Bank of England. Even in this, Art may be made to hold an important place; for idea in design can be seen in its impress, and thus almost the same, if not greater, from its mechanical construction, amount of security may be guaranteed, which I have previously stated was the object of *simplicity*. It possesses unity of parts and purposes in design which tell much against the imitator. It is organised, I think, as combining beauty with a business appearance. This small and convenient note can be divided into four parts for postal security.

Its principle is essentially the same as that in the simple note—having its own individuality; and I think it quite possible, by a thoughtful and judicious combination of the different kinds of engraving, such as scroll-work, engine-work, and vignette-work, to produce this.† Too much ornamentation is apt to bewilder, nay, misguide‡—too little is apt to abuse: but a proper combination of a certain

* Here was exhibited, by photo-microscopic means, a specimen of a Complex note.

† "Experience, however, shows that the public will adopt no such precautions unless driven to them by repeated losses; nor can, nor should, it rest satisfied so long as forged notes appear, which are *only to be discovered as such* by the comparison of duplicates, or a scrutiny of trained eyes. No Bank nor the public should, in my opinion, rest satisfied (so long as it can be otherwise provided) with a less amount of protection against forgery than that derived from a note of which there is no present probability of its being forged in a manner likely to avoid detection when examined by what may be termed *a glance of an educated eye, or a moderate inspection of an ordinary one.*"—*Grubb, Engineer of the Bank of Ireland.*

‡ "From such causes it is found by long experience, that any extraordinary complexity is not only useless, but delusive and dangerous, from leading the mind into details which cannot be successfully appreciated. The labour and exhaustion produced by minute inspection of any very fine work for any length of time is shown by experience to be great."—*Smee's Paper on the New Bank of England Note.*

amount of elaborate mechanical work, properly balanced to meet the effect of the design, will also combine beauty with security, with hardly less facility of recognition.

The feasibility of this has been lost sight of—in fact, it was not formerly attainable—nor was it practicable until the Electrotype became a recognised agent in practical reproduction. By this power, as you are aware, surfaces of any given dimensions can be multiplied without reference to the quantity or delicacy of the work: not so by the mode of reproduction known as the Siderographic process for transferring subjects engraved on steel to steel. This latter is certainly capable of reproducing to infinity, but with this important difference, that the smaller the subject the greater success in the transfer. While the fact of requiring retouching is an additional objection not at all applying to the Electrotype. You may thus understand that so long as a process of reproduction was adhered to, only capable of transferring small subjects or fragments of designs, and in every case requiring to be retouched by the graver, so long must this kind of note be built up as it were piece by piece, and thereby perpetuate the barrier between the Art-idea and the Art-mechanical.

I am confirmed in my view of the subject by no less an authority than that of the Bank itself; for had not surface-printing from electro-plates been adopted—a fact to which I have already referred—the Siderographic process would have been abandoned, and the electro-process substituted, still adhering to the copper-plate method of printing.

Since the discovery of the Electrotype, efforts have been made in several cases to apply its perpetuating power to the reproduction of copper engravings generally, with no better result, however, in every case than signal failure. The average number of impressions from one plate rarely reached 500—the electro-copper, too, spread from the pressure of the printing-press—and, in addition, from its softness, even curled round the cylinders. Too little attention was paid to the science of electro-deposition; and failure arose from a want of confidence in its power, and want of energy in investigation. At the present time, partly owing to the perfection at which the process has arrived, and partly owing to an additional new agency

brought into co-operation, I can state that an experiment was made a few months ago, under every possible disadvantage, to re-establish in this country (for it has long been in successful operation at Vienna) its practical, as well as its economical, adaptability. This experiment was made upon the Bank Note of the Brazilian Government amounting to 1,200,000 notes, of very elaborate work, which have been printed from Electrotype plates: at the completion of this work, the means for future production exist for printing as many million notes more as thousands have already been printed—and, with this certainty, that the last note printed shall be identical with the first. The electro-plates in this instance, partly owing to the increased hardness in the copper deposited, and partly owing to a particular method of treatment, have yielded on an average 1600 perfect impressions—and experiments are in course of operation for increasing this to between 3000 and 4000. The establishment of this fact renders it almost imperative that greater attention should be given to the character of a note. If at the time that Art was more or less in its infancy, every endeavour was made to elevate the character of this note, and reports of scientific and practical men were sought for, and their suggestions attended to; *à fortiori*, now that Science has done so much, and is capable of doing more, the Art-question of this subject ought to hold an important place in its consideration. The peculiar advantage of the Electro over the Siderographic process will be apparent, seeing that the Electro copies the whole surface—and furthermore, it copies the exact state of the plates, without requiring the aid of scraper or burnisher, or that careful retouching and deepening of lines, so indispensable to the success of Siderography.

I have made allusion once or twice to the term Siderographic in connection with Bank Note printing. This is a process for transferring figures from steel to steel, and thus multiplying the number of plates to be printed from. It is one of exceeding simplicity; but, as in most cases of the kind, however simple it may appear, it requires more than ordinary skill to effect successfully that little of which it is capable. It consists in taking up an engraved plate upon a roller of softened steel, a combination of rolling and pressure. The engraved subject thus stands in relief upon the roller. This roller then undergoes a process of

rehardening; the subject in relief is, by rolling and pressure, transferred to a surface of steel, softened to receive it. Identical plates are thus said to be produced. The advantages of this process, as a speedy and safe transfer, are more obvious than real. The process is founded on the property of steel, which admits of being softened or hardened at will. The objections are threefold,—First, every subject so transferred must be subsequently retouched by the graver. Secondly, its transferring properties are limited to very small subjects. Thirdly, and as a consequence, it is inapplicable to the manufacture of complex notes; besides, also, the not-to-be-neglected consideration of economy; and, as retouching is essential, I doubt whether it can be said that identity is secured.

I do not mean to say that Siderography has not succeeded, for that would be untrue. It has been in use for thirty years or more past in America; in fact, it was the invention of an American: but the Notes of the United States Government are not, and never have been—beautiful as their execution is—carried out after the principles I have put forward this evening. Whilst making reference to the American Notes, I will allude to a circumstance that would most puzzle the ingenuity, in reference to the prevention of forgery. The fact of America being divided into so many States, and each State being represented by a different note, the forgers did not think it worth their while to imitate any one, and therefore concocted a note of their own.*

The principles I have been advocating being established, it may prove interesting to supply some information concerning the Bank Notes of other countries. I will briefly allude to their general character. They carry on the face of them the absence of all those qualities which I have been insisting upon, and actually in many instances appear to offer a premium to forgery. The aim appears to make them as ugly as possible, without affording them any counterbalancing security. Individual figures may be well executed—mechanical workmanship may also seem to

* "For the prevention of alteration in the *sum* of the note, some American Banks caused their notes to be engraved with such difference of device for each denomination that the public were left without a *general resemblance* for their guidance. This has led to a curious and unforeseen result. The forgers *ceased to be imitators*, and issued notes with their own designs in lieu; which, in the confusion arising out of the multitude of designs of the genuine notes, pass current."—*Grubb, Engineer of the Bank of Ireland.*

be well done—but they are utterly destitute of leading ideas and harmonious properties—the proper attributes of a note. The Notes of the United States present engraved specimens of the highest order, but the subjects selected seem irrespective of their purpose, and the multiplicity of the figures distracts the attention.

Again, there are the Austrian Notes. These fall considerably below the standard of American excellence. Vague in design, coarse in execution, the broken character of their design and the inconvenience of their shape render them unfitted for their purpose: while certainly, no portion of the monetary value of a country ought to be represented by little billets of paper for two-pence. Prussian Notes too partake of the same objections—preserving, in many instances, the appearance of fancy stationery. The Russian Notes, still more obnoxious to the objections urged against those already named, possess no feature of Art upon their surface—and nothing can be worse than their construction—they might well be adopted for merchandise labels. In fact, were I to particularise the characteristics of all the different foreign notes that have come under my review, it would only become tedious, while placing them in the same category.

If, however, the notes of these States, betraying such defects, have in themselves upon the face of them an endeavour to perpetuate something of National Art, it must be plain that such a country as ours ought to be willing and able to effectuate a prototype of superiority. Reviewing them altogether in their technical construction, they are all more or less fabricated to defeat imitation. Great reliance for security is placed upon a combination of processes,* and the greater the number employed

* "According to my experience the fabrication of bank-notes or other similar papers is threatened with counterfeiting particularly from the following graphic processes, viz., autography, anastatics, photography, and copies of the engraving (chalcography and chemitypy). Any new process that does not effectually remove the possibility of imitation by means of any of these processes, will not answer the purpose. As for the imitation by means of drawing, it is of no great consequence, because the multiplication is too difficult and troublesome to be carried to any great extent. The chief attention must, therefore, be directed against the possibility of counterfeiting by either of the aforesaid processes. We have endeavoured to solve this task *by a combination of processes*, each opposed to the other in its manner of printing, by which method forgeries are rendered very difficult, because they cannot be accomplished by a single individual, but require the co-operation of several—thus considerably diminishing the probability of being kept a secret. Though the execution of several sorts of paper-money was, from want of time, not so artistically perfect as I could have

in their construction,—the more different the effect resulting from each,*—the more difficult it is supposed for the power of a single forger to embrace the exercise of the whole. This, however, is a fallacious dependence, for the confusion created tends to less particularity of observance upon the part of the public.

Thus much said upon the first part of my subject, the Manufacture of the Bank Note, I now proceed to the question of its Security, the question most difficult of solution For two reasons: On the one hand, because it is so generally admitted that what has been executed by one individual, may be copied by another. And on the other hand, because it is not in the nature of things that a person who cannot read, should be protected from imposition by the most clumsy forgery. Another reason might be added, the general facility afforded by Science, not merely for the reproduction of one special object, but of almost everything. It is not logical to suppose that while Science helps the producer, she withholds her help from the imitator, and this point is the main one to be considered in the security of the note. The first reason cannot be substantiated; while the second is disposed of, on the grounds of the general spread of education. What we then have to consider, is, what is the nature of the so-called scientific facilities, and what are the steps to be adopted in the shape of counter-foils, for while Science does help the imitator, she also comes again to the aid of the producer.

It might be questioned whether any person coming forward to explain how many reproductive processes existed, and to what extent they could be carried,

wished, yet we had the satisfaction to experience but very few instances of forgery—a result we solely owed to our principle, that is to say, to the above-mentioned combination of printing processes. This, in a few words, is the result of my experience concerning the printing of Bank Notes. Our experience in this matter is the richer, as the greatest variety of paper-money is in continual use in our country, and as every new discovery, every improvement in the fabrication of such papers, is communicated to our office for the purpose of being judged and tested by experiments. Thus we have by degrees accumulated a very considerable quantity of experience relative to a great variety of distinct processes, which, however, are so intimately connected with one another, that it is nearly impossible to communicate them separately."—*A. Auer, Director of the Imperial and National Printing Office, Vienna.*

* "There is a class of work which, from its minuteness, was expected to be a preventive both of alteration and forgery. I allude to that very fine writing in which the amount of the note is repeated some thousand times. The letters are too small to be read without a magnifier, consequently they are of little use for preventing the alteration of the sum of the note, while the writing is too easily forged to prevent imitation. In an impression from a forged plate of such a note I find this band of fine writing the best executed portion of the work."—*Grubb, Engineer of the Bank of Ireland.*

was exercising a privilege consistent with discretion. But my opinion is, that such a method of proceeding is capable of more good than evil, for the more light there is thrown upon the subject, and the more imitators perceive and understand that the eye of genuine Science is upon them, the more fearful they will be of venturing on spurious manufacture that will certainly eventually be detected; while, on the other hand, if Banking authorities will not themselves move in advance with the age, and adopt the means that are pointed out to them for the prevention of forgery, they themselves are morally culpable, more than the miserable forger.*

The Anastatic process has been on several occasions brought prominently forward with such promises, that its powers appeared of a dangerous character; competent to effect an unprincipled object.† It professes that copper-plate and other engravings, old or new, ancient or fresh, can be transferred to plates of metal, and reprinted as fac-similes without re-engraving. In such a manner it is supposed to be able to copy Bank Notes. I must admit that success, or partial success in some instances, has given rise to too much faith and unnecessary fear being placed in these professions. The process certainly has great claims to utility, if confined to its legitimate sphere; for instance, when within the short space of ten days, 200 sets of fac-similes of the great Austrian Map of Russia and Turkey, for the use of the generals and officers of our armies in the East, were reproduced

* "Now, I have a very strong opinion that this new method of making moulds, &c., is likely to produce a result exactly contrary to that which Mr. Smee anticipates.

"Mr. Smee appears to forget that that which gives additional facility to produce the legal mould also gives the same facility to produce the illegal. A patent here is of no avail, while the process is highly favourable to the forger. There is no necessity that he should use steel-faced dies,—brass, or even hard wood, will be adequate to his purpose; neither will he have to use pieces of brass for the shaded portions. I find, from direct experiment, that he has only to strike the wire web of the mould with suitable boxwood stamps to produce the required corresponding shades in the paper. So far from any additional difficulty being thrown in the way of the forger, I expect he will consider the new mould, so far as shading is concerned, to be quite a boon in his way, and that he will rejoice in getting rid of a large portion of the multitude of stitches of the old mould, quite as much as the paid, legitimate maker."—*Grubb.*

† Anastatic printing (from ἀνίστημι, *to stand up*), is performed as follows:—Immerse in, or moisten with, dilute nitric acid, the print or sheet of letter-press, &c., which is to be transferred; the acid softens the ink, and on passing the print in contact with the zinc plate through a lithographic press, the zinc plate will receive a reversed impression of the print: and on passing an inked roller over the zinc plate, the ink will adhere only to the slightly raised lines of the reversed impression, and on passing the plate with a sheet of damp paper again through the press, an impression of the original print is produced.

from 21 original copper-plate engravings, printed in Vienna in 1829. But here let me call your attention to the difference between the nature of the engraving that characterises a map, and that which characterises (or which *ought* to characterise) a Bank Note. The work in the one (the Note), whether it be complex or simple, ought to be sharp and clear, whereas in the case of the Map (and especially in the use for which it was required in the instance specified), it matters little whether the lines transferred possess great nicety of sharpness or not. The operation of effecting a transfer requires immense pressure; producing a flattening or spreading of the lines. In copper-plate printing, the ink lies upon the surface of the paper, not a transparent film as in surface-printing, but as a body: the body naturally having a greater tendency to spread, the film a less. Therefore, the best and simplest way to meet the supposed danger of the Anastatic is to adopt copper-plate and very fine work *—as surface-printing with open-work only favours the transfer.

If the Anastatic process thus lays claim to the ingenuity of an exhausted art, Photography comes before us as an infant science. When Photography made its first appearance, experiments were instituted in order to ascertain how far it might be made subservient to forgery. Copies of Bank Notes were certainly produced by one or other of the branches of this art—but not to an extent to be considered dangerous. The copies were imperfect—there was a loss in sharpness; an absence of reality; a want of printed effect. The colour, too, instead of being black as in printing, was a sort of brown sepia. Another failure was in the representation of the water-mark, which appeared indeed as if it were really existing but it was found impossible to give the peculiar effect of the water-mark produced by reflection and transmission. Up to this point then there was little to fear.† Since that time Photography has made great advances; and there

* "Anastatic printing cannot do the fine work of copper-plate engraving."—*J. B. Bacon, Esq., Evidence before Committee of Postage Label Stamps.*

† "Several years ago—about 1845—being struck with the possibility of applying photography to the forgery of bank-notes and other public securities, I made several experiments in order to know how far the various photographic processes were capable of being successfully employed in the imitation of the paper currency, and, in case they could, to find the means of preventing the fraud.

"I began by the Talbotype process, by first forming a negative by the direct contact of the bank-note

Henry Bradbury's Specimen of a Simple Bank Note

JANUARY 1. 1856.
J.L. № 12345.

JANUARY. 1. 1856.
J.L. № 12345

Bank of England.

I Promise to pay the bearer on demand
the sum of
TEN POUNDS
For the Governor & Company of the
BANK OF ENGLAND

Specimen

TEN

Specimen

Bradbury & Evans, Bank Note Engravers & Printers, Whitefriars London.

Henry Bradbury's Specimen of a Simple Bank Note

JANUARY. 1. 1856. J.L. № 12345.

JANUARY. 1. 1856. J.L. № 12345.

Bank of England.

I Promise to pay the bearer on demand
the Sum of
ET CETERA
Specimen
for the Governor & Company of the
BANK OF ENGLAND.
TEN
Henry Bradbury

Bradbury & Evans, Bank Note Engravers & Printers, Whitefriars London.

exists a process which is capable of producing a more serious result than that previously obtained; namely, a printing-plate; I am aware that in the present state of this process of Photography this result the rather applies to documents which are printed with black ink upon white paper. I have a right to infer, however, judging from precedents, that it may be made applicable to all.

In cases where the engraving on a note by reason of coarseness of character (such being exemplified more in letter-press than in copper-plate) is exposed to the reproductive powers of these processes, the Anastatic or the Photographic, and such modes of engraving must be from economical or other motives followed, then the antidote (at least, that in common use) consists in the adoption of printing in different colours.* For instance:—Suppose some words or design † elaborately

on a photographic paper, and then copying this negative also by contact, producing a positive, which was the closest possible imitation of the Bank Note, with this difference only, that the general colour of the letters and writing, instead of being black, were of a sort of brown sepia colour, which is the general tint of Talbotype pictures; but this did not seem to me a decided impediment to the success of the forger, for I conceived that by some chemical agents, the silver forming the dark parts of the false Bank Note could be finally turned into a black, similar to the colour of the ink. The most surprising result was the representation of the water-marks, which are worked in the texture of the Bank Note paper, and which appeared in the copy as if they were really also existing in the substance of the paper. I showed the result of the experiments to Mr. Marshall, the cashier of the Bank of England, and I believe I gave him one of my impressions. I pointed out to that gentleman the means which I thought would prevent the fraud, should skilful forgers ever succeed in obtaining the black colour of the ink and in imitating the Bank paper. These means consisted in employing inks of various colours in conjunction with black ink, to form the various devices and letters of the Bank Note.

"In photography, red, orange, yellow, and green, produce black; while blue, indigo, and violet, produce white. Now, from these different properties of the various colours, it is evident that a Bank Note, with its printing, emblems, devices, writing, &c., printed in variegated colours, would offer the greatest difficulties to the perpetration of the fraud; for the lightest colours to the eye would produce the darkest effect in the copy, while the darkest colours, such as blue, indigo, and violet, would be hardly represented at all, or but very slightly. It is, indeed, fortunate that photography, while offering to the forger the temptation to exercise his dangerous skill, at the same time teaches us the means to render his attempts abortive.

"Nothing is, in fact, more easy. The Bank of England, and Bankers in general, instead of issuing notes in their present dull state of black and white, have only to transform them into the most elegant and ornamental coloured designs, and they will not only frustrate all attempts of the forger, but have the advantage of enlivening the serious appearance of their counters, and spread an artistic taste among the mercantile community."—*Claudet.*

* My own opinion as to the desirability of adopting printing in colours for Bank Note work is rather to avoid it, and to seek security by the higher mode I have already advocated in either of my specimen notes, *simple* or *complex*,—fine-Art with admirable execution possesses far higher elements of security than any combination of colour can confer upon Art.

† See Specimen Plate.

engraved to be first printed in red on the white paper; and then the note itself to be printed over this in black—we should have a mixture of black print over red. In attempting to take an Anastatic or Photographic copy of this compound note, we shall have one printing-plate as the result: that is to say, that which was printed first in red, and that which was printed afterwards in black upon that red, is produced intermixed upon one plate, and whatever printing colour you apply to that plate for the purpose of producing an impression, you have the result of the two impressions in one colour; and the point, wherein lies the difficulty, is that the separation of the two printings first referred to, in different colours, cannot be effected without destroying the combined transfer. The more elaborate and artistic the second working in colour is rendered, the more the difficulty of dissection is increased. Again, another reason for employing artistic and elaborate work is to thwart the efforts of the forger, supposing him to make use of the transfer for the purpose of engraving by hand, instead of using the chemical transfer. Also: if instead of taking those colours that are copyable by the agency of light, we select those colours that are *not* copyable, we shall have a result, which, though not precisely the same, presents difficulties equally insuperable, provided the work be of that character which is produced by the rose-engine-work; for, if these colours are *not* copyable by this agency, and those colours represent work which cannot be copied on the score of mechanical imitation, the forger stands in the same difficult predicament as before. To these points the attention of Banking authorities is already awakened, as the adoption of it in whole or in part, has become a prominent feature in commercial securities.

With regard to these processes, admitting that they are, as they really are, the latter especially, dangerous where the execution is indifferent in character: or, on the other hand, that they are *not*, or that they are merely put forward to subserve a business purpose,—in either case they should not be disregarded. If no notice be taken of them by Bankers, if forgers perceive that increased facilities for copying are not met by increased efforts to defeat them, such indifference only gives encouragement for cultivating forgery as a science.

Having spoken of diversity of opinion, I can give you a curious and amusing

illustration: conversing with an eminent paper-manufacturer on the subject, his opinion was that the less novelty of design, the less approach to that which was artistic, and therefore the more we adhered to past forms and figures, the better—to this I retorted, by remarking, that in his own particular department he had not abided by that dictum, for he had spent time, thought, and money, in elevating the character of the water-mark to the highest point of excellence—thereby realising the fact that he preferred an invisible immortality to the more satisfactory

I PROMISE TO PAY.

Thus far I have made but casual mention of the water-mark, not regarding it as unimportant, but secondary to the main consideration; for a successful copy of a good engraving* upon a spurious water-mark is more likely to impose upon the ignorant, than an inferior engraving upon the genuine water-mark.† If then the water-mark were backed by the excellence of Art and engraving,‡ you might safely

* "I am thus led to the following conclusions with respect to the new method of making moulds with shaded portions, and letters and devices for same, viz.:—

"Firstly. That letters, and other such devices, being more readily prepared by the new process, it follows that the multiplying such on the surface of the paper mould will in future be of less hindrance to the forger than formerly.

"Secondly. That shaded figures or designs are so readily formed in the web of the mould by pressure from wooden blocks that no trust should be placed in such devices.

"Thirdly. That from henceforth we should trust less to the water-mark as the test of the genuineness of a note, and consequently it is of increased importance that some portion of the printing should afford an adequate protection against forgery."—*Grubb, Engineer of Bank of Ireland.*

† "It is, therefore, evident that with the exception of the preparation of the mould, a *small amount of water-mark* is just as great a bar in the way of forgery as the most elaborate. And now to consider this difficulty of the mould, will the man who would sit down to make a fraudulent mould, requiring, it may be, a score of letters to be formed in wire and stitched down on the surface, *be deterred* by having a second score to imitate, and a double quantity of stitches to perform? And whether, I would also ask, is it more likely that forgery will be prevented by a contrivance requiring, perhaps *a couple of days'* additional time of a mould-maker or wire-worker to copy, or by the adoption of such engravings for the note as would require for the production of a reasonably good copy *as many months* of the time of an artist following a respectable profession?"—*Grubb, Engineer of Bank of Ireland.*

‡ "*For the Subject Matter in Design.*—In addition to the needful mercantile portion, I would include both historical and machine engraving. I would use *both* these, because they are branches of the engraving art *scarcely ever combined* in the practice of one individual, and that experience shows, *by increasing the number of hands* requisite to produce a forgery, *we throw a great obstacle in the way* of its perpetration. I would use *historical* engraving, because it is only to be copied by *hand*; also as being the highest class of engraving, and as those who attain any proficiency in the art are, from their position, little liable to be tempted to descend to forgery. I would use *machine* engraving, because, if it be chosen of a suitable description, it will be most difficult to imitate *without the aid of a machine*, and we know that forgers are

assert that the Bank Note was unforgeable. But if it may be said, the paper thus alone furnishes an absolute security, why make so great a point of Art, design, engraving, &c., in its manufacture?—Because whatever internal security exists in the paper, tends rather to the security of the Bank.*—There should also be a *primâ facie* security † for the Public, and if both are applied, they re-act upon each other, and the note is perfect. With reference to the paper there is little more to be said beyond this, that there is no occasion to endeavour to burden it with peculiarities beyond what is expressed by excellence of manufacture. The full consideration of the question of the manufacture of the paper is a subject sufficiently ample to afford a subject in itself—apart from the newly raised question of making paper from other substances than those now in use. Some foreign Banks adopt the plan of having different-coloured papers for the notes of different denominations of value; how far this is an advisable plan admits of question, for in addition to the fading of colour, the circumstance of receiving a piece of coloured paper is apt to induce a false security, assuming without inspection that the document is of a certain supposed value.

not likely either *to incur the expense or brook the delay* of obtaining such. Lastly, *in the selection* of subjects (both historical and machine-engraved) I would be governed by previous experience, selecting such subjects as are best adapted to being engraved in *single line* (without cross-hatching), and with strong effect of light and shade, avoiding work of a very fine character, and selecting that whose lines and markings can be seen as such by an ordinary unassisted eye."—*Grubb, Engineer of Bank of Ireland.*

* "The new or shaded water-mark affords a small additional protection, mainly, however, to the Bank, as enabling them to discriminate a forgery when other sources fail. To make it available to any party each note in examination must be held separately up to the light, and I believe that the public will agree with me in concluding that they would be at once more conveniently and more efficiently protected by something suitable printed on the paper, which could be examined by being looked at, rather than something in the paper, which can only be examined by looking through it."—*Grubb, Engineer of Bank of Ireland.*

† "What we should endeavour to obtain—What is practicable on an extensive scale—The means of securing the objects in view, and those plans which may give sufficient protection against one form, may afford no security against some other mode of forgery.—And that two classes of persons are to be protected, the one all alert, attentive, and suspecting; the other comparatively inattentive, unsuspecting, and off their guard.

"It is evident that the private marks known to the Bank clerk, and the absence of which is to him the signal for suspicion and increased care, are of no avail as protection to the public.

"The great object is to paralyse or neutralise the incessant efforts of the skill and audacity of the forger, by accumulating difficulties in the accomplishment of his project, and to do this with due regard to the inattention, inexperience, and want of skill of the public.

"It would seem that a true safety paper can be efficacious only in proportion as its characteristic signs speak to the eyes of the general public, and not exclusively to those of the expert and practised; for the professional eye is quick in observing points which escape general observation."—*W. Stones.*

Having shown that production and reproduction react upon each other, the question is according to what plan the Bank Note should be manufactured? My reply is, Let Art be impressed on the note.—Let ingenuity of design, executed by a hand whose genius would at once indicate its authority, be adopted so far as is consistent with a commercial purpose.—Let that mode of printing be employed which alone can render the delicacy and force of an Art-subject. If this course be followed, the greatest possible amount of difficulty would be placed in the way of reproduction by hand; the two scientific processes referred to cannot be brought to bear against it—and further, which should be another grand object, this Art-education of the people would eventually teach them prudence in distinguishing the genuine from the false. I would still continue to adhere to having paper of the highest quality, whose water-mark should partake of Art-design, and which should be so arranged as to be only visible on those parts of the note unoccupied by the engraving—so that a Bank Note should consist of one design, shown alternately by the water-mark and alternately by the engraving on the face of it. Such a note might be fairly deemed unforgeable.* Lastly, if this should eventually be found insufficient to secure the desired result of unforgeability, then it should be imperative on the Government in committee to resolve this question, and offer a reward, as has been done in other great public questions, for its solution.†

Whilst on the question of paper and materials, I would draw your attention to the diagrams of its manufacture on the screen: they represent the machinery of Mr. T. H. Saunders, of Dartford, Kent. At one glance you can comprehend their

* "To attempt to construct an unforgeable or inimitable note would be a mere delusion and snare. The public should know that everything which has been made can be copied, and without due care, whether they are numismatists, and look after Dories and Queen Ann's farthings, or antiquarians, and collect old bibles or ancient manuscripts; whether they seek to buy gold-dust or sell precious stones; whether they transact their business by bills, notes, cheques, or coins, they are in all cases liable to fraud and deception, and ever will be liable so long as evil remains in the world."—*Mr. Smee's Paper on the New Bank of England Note.*

† "In regarding the future operations of the Bank, I cannot but think that the results which have been described are the first step of the commencement, and not the end of those improvements which will take place in the production of Bank Notes. If the use of the steam-press exceeded my own propositions, yet in many respects the result has fallen short of my anticipations. Considering the great importance of an uniform note of a certain standard of perfection, it was necessary to take the most prudent course, nevertheless I cannot bring my mind to suppose that the processes can possibly stop where they are."—*Ibid.*

magnitude and importance, and what science, labour and capital, must be expended in the production of the Bank Note paper.* These examples represent the water-marks of ancient days; those which I have the pleasure to exhibit to you show the excellence of my friend's foregone conclusions, how consistently you will see, that we should improve a water-mark to such a wonderful height as this, and yet be content to retrograde in the engraving.

In conclusion, the few remarks I have to make are to explain the great difficulty I have experienced in condensing the enormous amount of detail necessarily belonging to this subject, to make it sufficiently embrace its main points: the question, as I have before stated, is open to great difference of opinion; still it must be borne in mind, that the opinions I have advocated are the result of thought, reading, and experience. The step I have taken in thus coming forward may, to some, appear a bold one; but, while I would deprecate censure on this account, I can appeal to the evidence of many eminent men who have lived before me, and whose opinions are corroborative of my own. To my friend Mr. John Leighton (better known by his *nom-de-guerre* of Luke Limner) I am indebted, for his kindness and co-operation in furnishing me with the designs for notes expressive of my views on the subject. I am indebted for the photographic copies on glass of the specimens for microscopic illustrations, to my friend Mr. Hennah, of Brighton.†

* "A somewhat different process has been recently patented by Mr. Saunders, who has honourably conceded to his assistant, Mr. W. Stones, the credit due to the invention. It resembles that suggested by Mr. Oldham of the Bank of England, in which, as in Mr. Portal's plan, designs in outline *and in shade*, can be introduced, which have hitherto been confined to words in Roman characters, or devices of the simplest kind, and these in outline only. It appears to be peculiarly adapted to large, and also in some degree to small papers, producing a very good effect."—*Granville Sharp, Prize Essay.*

† The reasons that induced me to adopt the photo-microscopic mode of illustrating my subject, were to afford the members and visitors of the Institution, the facility of viewing each specimen, all at once and at the same time.

END OF
TITLE